

**TRANSLATION****PATENT COOPERATION TREATY****PCT****INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>000055304</b>	<b>FOR FURTHER ACTION</b>	See Form PCT/IPEA/416
International application No. <b>PCT/EP2005/000781</b>	International filing date (day/month/year) <b>27.01.2005</b>	Priority date (day/month/year) <b>29.01.2004</b>
International Patent Classification (IPC) or national classification and IPC <b>C07C253/10, C07C255/07</b>		
Applicant <b>BASF AKTIENGESELLSCHAFT</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.	
2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.	
3. This report is also accompanied by ANNEXES, comprising:	
a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>6</u> sheets, as follows:	
<input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).	
<input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.	
b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s))	
_____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).	
4. This report contains indications relating to the following items:	
<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input type="checkbox"/> Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/000781

Box No. I

Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-94 as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. \_\_\_\_\_ as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* 1-16 received by this Authority on 18.11.2005 with letter of 11.11.2005
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- sheets 1/10-10/10 as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (specify): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (specify): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (specify): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/000781

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-16	YES
	Claims		NO
Inventive step (IS)	Claims	1-16	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

This report makes reference to the following documents:

- D1: US 3 536 748 A (WILLIAM C. DRINKARD JR ET AL), 27 October 1970 (1970-10-27)
- D2: EP 0 274 401 A (E.I. DU PONT DE NEMOURS AND COMPANY), 13 July 1988 (1988-07-13)
- D3: WO 99/07671 A (BASF AG; FISCHER, JAKOB; SIEGEL, WOLFGANG), 18 February 1999 (1999-02-18)

The present application relates to a process for producing 3-pentene nitrile characterised by the following steps:

- (a) isomerisation of an edduct stream which contains 2-methyl-3-butene nitrile, with at least one dissolved or dispersed isomerisation catalyst, so as to produce a stream 1 which contains at least one isomerisation catalyst, 2-methyl-3-butene nitrile, 3-pentene nitrile and (Z)-2-methyl-2-butene nitrile;
- (b) distillation of stream 1, so as to yield a stream 2 as a head product which contains 2-methyl-3-butene nitrile, 3-pentene nitrile and (Z)-2-methyl-2-butene nitrile, and a stream 3 as a bottom product which contains at least one isomerisation catalyst;

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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(c) distillation of stream 2, so as to yield a stream 4 as a head product which, in comparison with stream 2, is richer in (Z)-2-methyl-2-butene nitrile, relative to the sum of all pentene nitriles in stream 2, and a stream 5 as a bottom product which, in comparison with stream 2, is richer in 3-pentene nitrile and 2-methyl-3-butene nitrile, relative to the sum of all pentene nitriles in stream 2;

(d) distillation of stream 5, so as to yield as stream 6 a bottom product which contains 3-pentene nitrile, and as stream 7 a head product which contains 2-methyl-3-butene nitrile, the (Z)-2-methyl-2-butene nitrile-depleted 2-methyl-3-butene nitrile being recycled.

D1 (see the passages cited in the ISR) represents the closest prior art and discloses the isomerisation of 2-methyl-3-butene nitrile with a  $\text{Ni(0) [P(OC}_2\text{H}_5)_3]_4$  catalyst, so as to yield a liquid product stream which is then vacuum-distilled. The distillate comprises 2-methyl-3-butene nitrile, 3-pentene nitrile, 2-methyl-2-butene nitrile and 4-pentene nitrile; the bottom stream composition is not further described, but should contain the catalytic system and possible solvents. The subject matter of claim 1 thus differs from D1 by the distillation steps (c) and (d).

The technical problem addressed is thus considered to be that of providing another process for producing 3-pentene nitrile. The solution is presented in claim 1 and relates to the distillative separation steps (c) and (d), as well as to the recycling of the (Z)-2-methyl-2-butene nitrile-depleted 2-methyl-3-butene nitrile.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/000781

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

This combination of features is neither known nor can be directly derived from the closest prior art in D1, either alone or in combination with D2 or D3. Also surprising for a person skilled in the art are the low losses of 2-methyl-3-butene nitrile during the distillative separation of (Z)-2-methyl-2-butene nitrile (cf. examples 1-4 of the present application), since the boiling points of both compounds are only slightly different.